

Brookhaven National Laboratory/National Synchrotron Light Source				
<b>Subject:</b>	<b>X17B3 Radiological Interlock Test</b>			
<b>Number:</b>	LS-PPS-0033	<b>Revision:</b>	C	<b>Effective:</b> 1/13/2005
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Prepared/Approved By: M. Buckley	Approved By: S. Buda	Approved By:
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\*Approval signatures on file with master copy.

[Revision/Periodic Review Log](#)

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Test Reason:	Test Result: <input type="checkbox"/> Passed <input type="checkbox"/> Failed	
	Test Type: <input type="checkbox"/> Full <input type="checkbox"/> Partial	
Test Date:	Start Time:	Finish Time:
Tester 1:	Assistant 1:	
Tester 2:	Assistant 2:	

#### PREPARATION:

Inform control room operator that test will be done.

Turn off 'Red Tag' switch on x-ray ring interlock, and apply LOTO to X-Ray Security system.

Verify that vacuum valves and water interlocks are satisfied on X17B1.

Verify all hutch door thresholds are in place.

#### 1. Press CS-1

The overhead lights go out

The red interior light comes on

Press CS-2, close hutch door, and Press CS-E

The audible alarm sounds for 13 to 15 seconds minimum

The hutch interlock sign turns on

#### 2. Open hutch door

The hutch interlock sign goes out

#### 3. Press second check station, CS-2

Pilot light does not stay ON

Press CS-1

Pilot light does come ON

Exit hutch, close door, Press CS-E

Interlock does not activate.

#### 4. Press second Check station, CS-2

Pilot light does not stay ON

Exit hutch, close door, and press CS-E

Interlock does not activate.

#### 5. Press CS-1, Press CS-2, close hutch door and wait.

Hutch interior lights come on in not more than 50 seconds

Press CS-E.

Interlock does not activate

#### 6. Press interior search buttons, close door, press CS-E, note that alarm comes on, open and close door, press CS-E again. (This must all be done in less than the timeout interval noted in step 5).

Interlock does not activate

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7. Switch Direct Beam Stop (DBS) to "**White**" Mode and shutter control switch to 'B3'.  
Secure Transport Hutch. Lower the X17B1 Beam Backstop in the OPEN position.  
Secure X17B1, & X17B2 hatches.  
Place latch devices on X17B3 hutch door locks so key can be removed. Place switch holders on hutch door switches.

The Small Transport Enclosure Safety Shutter (STRESS) and B2 Backstop "enable" light does not come on until the end of the warning interval. \_\_\_\_\_

- |                                                           |                   |                   |
|-----------------------------------------------------------|-------------------|-------------------|
| 8. Press an Emergency Stop Button.                        | <b><u>ES1</u></b> | <b><u>ES2</u></b> |
| The shutter "enable" light goes out                       | _____             | _____             |
| The B2 Backstop "enable" light goes out                   | _____             | _____             |
| The ES indicator comes on                                 | _____             | _____             |
| The ES latch cannot be reset unless the SOR key is turned | _____             | _____             |
- Search hutch and repeat for remaining ES button(s).

9. Secure hutch, put door key in SRU and turn, and open STRESS and Beamline Safety Shutter (BLISS).

Verify BLISS opens before STRESS \_\_\_\_\_

**Open the B2 Backstop**

<b>Caution:</b> Stay Clear of Backstop During Operation
------------------------------------------------------------

The "Beam ON" signs turns ON \_\_\_\_\_

<b>Door:</b>		
<b>1</b>	<b>2</b>	<b>3</b>

- |                              |       |       |       |
|------------------------------|-------|-------|-------|
| Remove holder from switch 2. |       |       |       |
| RIB latch light comes ON     | _____ | _____ | _____ |

- |                                               |       |       |       |
|-----------------------------------------------|-------|-------|-------|
| Replace holder on switch 2.                   |       |       |       |
| RIB cannot be reset unless SOR key is turned. | _____ | _____ | _____ |

- |                                                         |       |       |       |
|---------------------------------------------------------|-------|-------|-------|
| 10. Remove holder on switch 1.                          |       |       |       |
| STRESS closes                                           | _____ | _____ | _____ |
| Verify STRESS closes 1 <sup>st</sup> and then the BLISS | _____ | _____ | _____ |
| BLISS closes                                            | _____ | _____ | _____ |
| RIA latch light comes on                                | _____ | _____ | _____ |
| Hutch interlock drops out                               | _____ | _____ | _____ |
| "Beam On" sign is OFF                                   | _____ | _____ | _____ |
| RIA can't be reset w/o SOR                              | _____ | _____ | _____ |

Close the B2 Backstop

11. Secure the hutch and leave shutters closed.  
Hutch Kirk key (KKH) cannot be removed from SRU unless button is pushed \_\_\_\_\_

12. Open STRESS and B2 Backstop.

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- \_\_\_\_\_
- KKH cannot be removed even if button is pushed
13. Close shutters and B2 Backstop. Turn KKH and note where solenoid unit stops rotation. Push the button and turn key just beyond this point, but not far enough to actuate "key removed" switch. Release the button and leave key in this position.  
Open shutters and B2 Backstop, remove KKH, and replace.
- \_\_\_\_\_
- RIA latch light comes on
- \_\_\_\_\_
- RIB latch light comes on
- \_\_\_\_\_
- The STRESS closes
- \_\_\_\_\_
- The BLISS closes
- \_\_\_\_\_
- Reset RIA & RIB and replace KKH in SRU.
14. Beam line lockout key can be removed only if button on SRU is pushed  
Open STRESS
- \_\_\_\_\_
- Beam line lockout key can't be removed even if button is pushed
- \_\_\_\_\_
15. Close STRESS, cheat BLKK SRU, and open STRESS (BLISS Opens automatically).  
Remove B/L lockout key, and replace.
- \_\_\_\_\_
- RIA trips
- \_\_\_\_\_
- RIB trips
- \_\_\_\_\_
- STRESS closes
- \_\_\_\_\_
- BLISS closes
- \_\_\_\_\_
- SPA comes on when key is replaced.
- \_\_\_\_\_
- SPA can't be reset w/o SOR
- \_\_\_\_\_
16. Open STRESS and B2 Backstop. Press an emergency stop button.
- \_\_\_\_\_
- RIA latch light comes on
- \_\_\_\_\_
- RIB latch light comes on
- \_\_\_\_\_
- Hutch interlock drops out
- \_\_\_\_\_
- STRESS closes
- \_\_\_\_\_
- BLISS closes
- \_\_\_\_\_
- Reset RIA, RIB, and ES. Secure B3 hutch.
17. Open STRESS 'B' by pressing and holding the button on the air solenoid. The BLISS remains closed.  
Remove holder on switch 2 and replace.
- \_\_\_\_\_
- RIB trips
- Reset RIB, release switch 1
- \_\_\_\_\_
- RIA trips
- \_\_\_\_\_
- Close STRESS by releasing solenoid button, and Reset RIA.
18. Secure hutch. Turn off air to STRESS on solenoid bank, cycle shutter open & closed until it remains closed when open button is pressed.  
Open BLISS and release switch 2.
- \_\_\_\_\_
- RIB trips
- Reset RIB, release switch 1
- \_\_\_\_\_
- RIA trips
- \_\_\_\_\_
- BLISS closes
- \_\_\_\_\_

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Open air valve to solenoid bank.

19. Switch DBS to **MONO** mode. Secure hatch. Open STRESS, BLISS, and B2 Backstop.

Door:		
1	2	3

Remove holder from switch 2.

RIB latch light comes ON

\_\_\_\_\_

Replace holder on switch 2.

RIB cannot be reset unless SOR key is turned.

\_\_\_\_\_

20. Remove holder on switch 1.

STRESS closes

\_\_\_\_\_

BLISS closes

\_\_\_\_\_

RIA latch light comes on

\_\_\_\_\_

Hutch interlock drops out

\_\_\_\_\_

"Beam On" sign goes out

\_\_\_\_\_

RIA can't be reset w/o SOR

\_\_\_\_\_

Secure hatch and Close B2 Backstop.

21. Cheat hatch SRU, Open STRESS, BLISS, and B2 Backstop.

Remove hatch Kirk key

RIA trips

\_\_\_\_\_

RIB trips

\_\_\_\_\_

STRESS closes

\_\_\_\_\_

BLISS closes

\_\_\_\_\_

Replace key and reset RIA & RIB.

22. Open STRESS and BLISS. Press an Emergency Stop

RIA trips

\_\_\_\_\_

RIB trips

\_\_\_\_\_

STRESS closes

\_\_\_\_\_

BLISS closes

\_\_\_\_\_

Reset RIA, RIB, and ES.

23. Secure hatch.

Beam line lockout key can be removed only if button on SRU is pushed

\_\_\_\_\_

Open STRESS

Beam line lockout key can't be removed even if button is pushed

\_\_\_\_\_

24. Close STRESS, cheat B/L SRU, and open STRESS and BLISS. Remove B/L lockout key, and replace.

RIA trips

\_\_\_\_\_

RIB trips

\_\_\_\_\_

STRESS closes

\_\_\_\_\_

SPA comes on when key is replaced

\_\_\_\_\_

SPA can't be reset w/o SOR

\_\_\_\_\_

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25. Open the STRESS. Remove the Control Room Shutter Enable Key for X17B1, and then replace the key.

STRESS closes	_____
RIA trips	_____
The "Control Room Inhibit" light comes on	_____
The SPA latch comes on (after the key is back on)	_____
STRESS cannot be opened	_____
Reset RIA and SPA at X17B1 & X17B3	

26. Complete steps 26 - 30 for both "White" and "MONO" DBS modes.
- |                                                                                                                               | <u><b>Mono</b></u> | <u><b>White</b></u> |
|-------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------------|
| One person goes to the x-ray equipment area and observes the indicators for RIAX and RIBX. Open STRESS, BLISS, & B2 Backstop. |                    |                     |
| Remove switch holder from door switch number 2.                                                                               |                    |                     |
| RIB latch light comes on                                                                                                      | _____              | _____               |
| RIBX trips                                                                                                                    | _____              | _____               |
| Replace switch holder. Attempt to reset RIBX.                                                                                 |                    |                     |
| RIBX will not reset                                                                                                           | _____              | _____               |
| Reset RIB.                                                                                                                    |                    |                     |
| RIBX resets                                                                                                                   | _____              | _____               |

27. Remove holder from door switch 1.
- |                          |       |       |
|--------------------------|-------|-------|
| RIA latch light comes on | _____ | _____ |
| RIAX trips               | _____ | _____ |
| Attempt to reset RIAX    |       |       |
| RIAX will not reset      | _____ | _____ |
| Reset RIA                |       |       |
| RIAX resets              | _____ | _____ |

28. Open the STRESS.
- Turn "Auto Open" key to "ON".
- At the Control Room Operator's Console, switch the shutter master enable to "Inhibit" and back to "Enable".
- |                                                            |       |
|------------------------------------------------------------|-------|
| The STRESS closes                                          | _____ |
| And then re-opens                                          | _____ |
| Turn "Auto Open" key to "OFF".                             |       |
| Switch the master enable to "Inhibit" and back to "Enable" |       |
| The STRESS closes                                          | _____ |
| And <u>does not</u> re-open                                | _____ |

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- |     |                                                                                                                                                                     | <u><b>Mono</b></u> | <u><b>White</b></u> |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------------|
| 29. | With Shutter Selection Switch on the X17B3 position, do the following:                                                                                              |                    |                     |
|     | Open STRESS at X17B3                                                                                                                                                |                    |                     |
|     | Attempt to Close STRESS at X17B1                                                                                                                                    |                    |                     |
|     | STRESS Closes                                                                                                                                                       | _____              | _____               |
|     | Attempt to Open STRESS at X17B1                                                                                                                                     |                    |                     |
|     | STRESS does not Open                                                                                                                                                | _____              | _____               |
|     | Open STRESS at X17B3                                                                                                                                                |                    |                     |
|     | Attempt to Close STRESS at X17B2                                                                                                                                    |                    |                     |
|     | STRESS Closes                                                                                                                                                       | _____              | _____               |
|     | Attempt to Open STRESS at X17B2                                                                                                                                     |                    |                     |
|     | STRESS does not Open                                                                                                                                                | _____              | _____               |
| 30. | Open STRESS, BLISS, & B2 backstop. Shut off water-cooling to the B3 Backstop (Close supply water valve).                                                            | <u><b>Mono</b></u> | <u><b>White</b></u> |
|     | STRESS Closes                                                                                                                                                       | _____              | _____               |
|     | BLISS Closes                                                                                                                                                        | _____              | _____               |
|     | X17B3 enable light goes out                                                                                                                                         | _____              | _____               |
|     | Open Supply water valve and Reset X17B3 water interlock fault.                                                                                                      |                    |                     |
|     | Close B2 Backstop.                                                                                                                                                  |                    |                     |
| 31. | Break security in the B2 Hutch.                                                                                                                                     |                    |                     |
|     | Verify B2 Backstop cannot be moved                                                                                                                                  |                    | _____               |
|     | Re-secure the B2 Hutch.                                                                                                                                             |                    |                     |
|     | Verify the B2 Backstop can be moved.                                                                                                                                |                    | _____               |
|     | Press the Hydraulic Emergency Stop on the backstop control panel.                                                                                                   |                    |                     |
|     | Verify the B2 Backstop cannot be moved.                                                                                                                             |                    | _____               |
|     | Release the E-Stop switch and Reset the Hydraulic E-Stop fault.                                                                                                     |                    |                     |
|     | Verify the B2 Backstop can be moved.                                                                                                                                |                    | _____               |
|     | Close the B2 backstop.                                                                                                                                              |                    |                     |
|     | Break security in the B3 Hutch.                                                                                                                                     |                    |                     |
|     | Verify the B2 Backstop cannot be moved.                                                                                                                             |                    | _____               |
|     | Break security in the B2 Hutch. Press the Hydraulic Emergency Stop in the B2 Hutch.                                                                                 |                    |                     |
|     | The E-Stop LED lights on the shutter control box.                                                                                                                   |                    | _____               |
|     | Release the E-Stop switch and Reset the Hydraulic E-Stop fault.                                                                                                     |                    |                     |
| 32. | Remove the holders from the X17B3 hutch door switches. Remove the latch device from the X17B3 hutch door locks. Stand inside the hutch and open and close the door. |                    |                     |
|     | All door switches operate freely and each "clicks" when door is opened                                                                                              |                    |                     |
|     | <b>X17B3:</b> _____                                                                                                                                                 |                    |                     |

\* \* \*